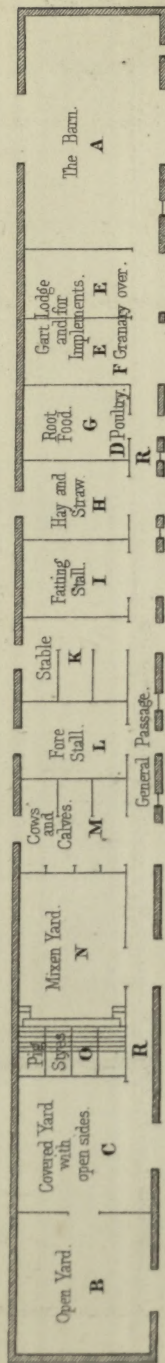
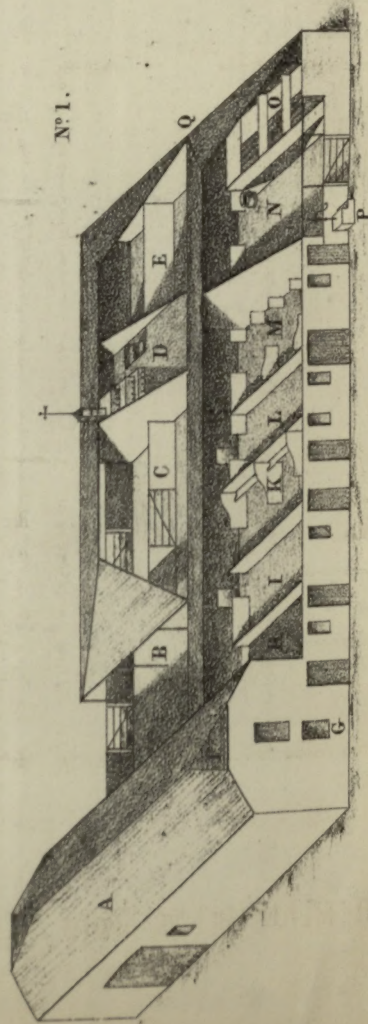


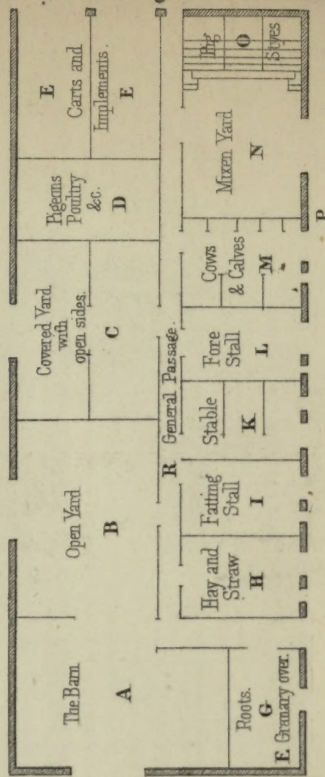
N<sup>o</sup> 2.



Scale  $\frac{1}{32}$  to a Foot.



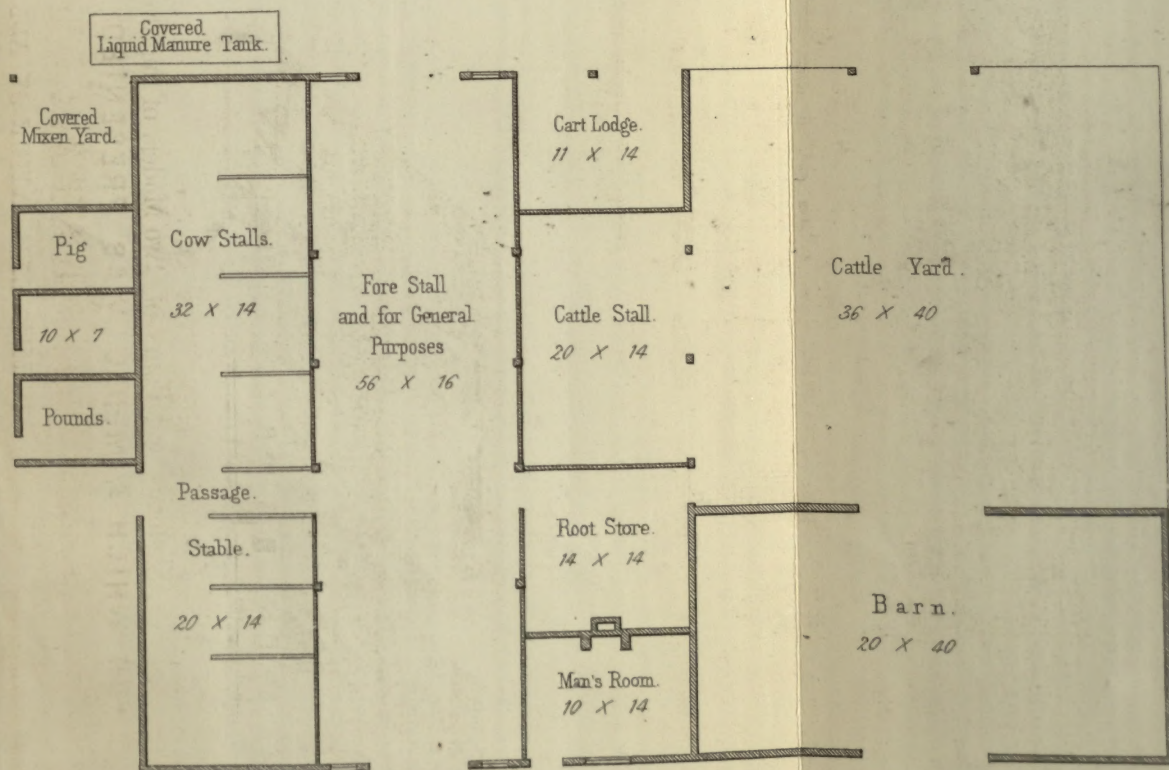
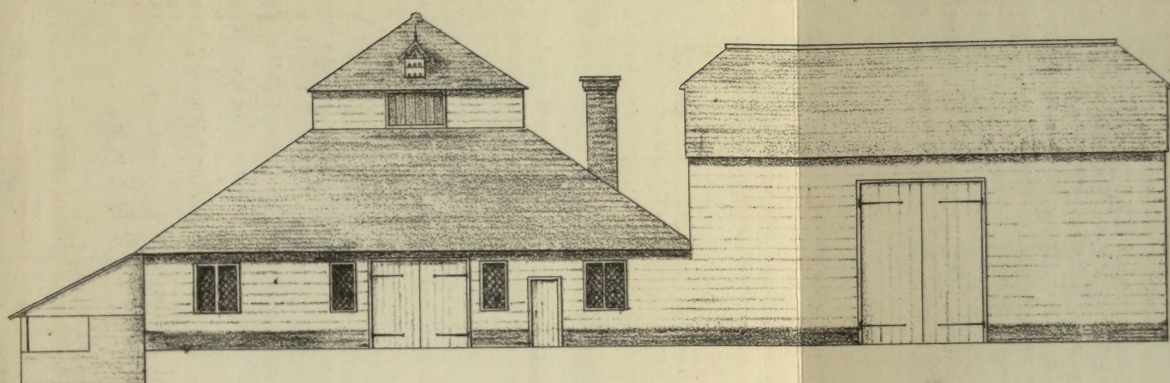
N<sup>o</sup> 1.



P. Manure Pumps. Q. Water Pumps.



FOR WHICH A MEDAL WAS PRESENTED BY THE COMMISSIONERS,  
 DESIGNED BY J. BAXTER, -LEWES, AND SHOWN  
 AT THE EXHIBITION OF ALL NATIONS. 1851.



Scale 1/4" to a Foot.

SKETCH AND PLAN OF MODEL N<sup>o</sup> 3. ERECTED AT OAKLANDS, 1852.





A BRIEF DESCRIPTION

OF

# TWO MODELS

OF

## IMPROVED FARM-YARD AND BUILDINGS,

WITH THEIR ADVANTAGES.

SHOWN AT THE

INDUSTRIAL EXHIBITION IN 1851,

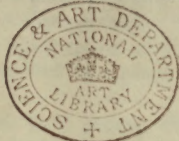
(NOW ADDED TO THE LIBRARY OF AGRICULTURAL KNOWLEDGE,)

BY JOHN BAXTER,

OF

LEWES AND OAKLANDS FARM, SUSSEX.

THE DESIGNER.



LEWES:

PRINTED AND PUBLISHED AT THE SUSSEX AGRICULTURAL EXPRESS OFFICE, BY  
BAXTER AND SON.

LONDON: SIMPKIN AND MARSHALL, STATIONER'S COURT, AND RIDGWAY, PICCADILLY.

1852.

26.11.67.

*Contributed by Mr*



A BRIEF DESCRIPTION

# TWO MODELS

IMPROVED FARM-YARD AND BUILDINGS

WITH THEIR ADVANTAGES

OF THE

INTERNATIONAL EXHIBITION IN 1881

AND THE ADVANTAGES OF AGRICULTURAL KNOWLEDGE

BY JOHN HARTER

NEW YORK: PUBLISHED BY J. H. RAY, 1881

THE END

THE AUTHOR'S NOTE:—The models of the improved farm-yard and buildings, which were exhibited at the International Exhibition in 1881, and which were the subject of the report of the Commission of the Exhibition, are now published in this form, and are intended to be a permanent record of the progress of agriculture in the United States.

## DESCRIPTION OF THE MODELS, &c.,

*Leaving part of the roof uncovered to exhibit the interior.*

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These MODELS were planned by the Designer and intended for his Farm at Oaklands, near Lewes, Sussex, to ensure shelter, warmth, cleanliness, and economy in the management of Stock; a more perfect system of collecting and appropriating manure; and a full supply of water to each department; whilst the workmen being sheltered may be employed in any weather in preparing food or manure. Models 1 & 2 are similar in character, differing only in the arrangement of the ground plan, to suit any site. Economy in erection and permanency have been duly considered.

GENERAL REMARKS.—The Designer, for upwards of half a century, has been connected with agriculture, and has devoted great attention to the improvements which have been made in husbandry; but none has he observed more particularly than Farm Yard Management. Under the patronage of the Duke of Richmond, the late Earl of Egremont, and most of the leading supporters of British Husbandry, he has directed especial attention, in his "LIBRARY OF PRACTICAL AGRICULTURE," to this important department of Farming, and if he may judge from the sale of 9,000 copies of that Work, not without great success.

### REFERENCES TO THE DIAGRAMS OF THE MODELS.

- A**—The BARN.
- B**—OPEN YARD AND HOVEL.
- C**—COVERED YARD with open sides.
- D**—PIGEON HOUSE
- E**—CART AND IMPLEMENT LODGE AND CHICKEN HOUSE.
- F**—GRANARY.
- G**—TURNIP, MANGEL WURZEL, AND OTHER ROOT FOOD DEPARTMENT.
- H**—HAY & STRAW for daily use.
- I**—STALL places for Fattening Stock or other purposes.
- K**—STABLE.
- L**—FORE STALL, (between the horses & cows) & for food.

This arrangement economises labour and is attended with advantage in feeding.

- M**—COW STALL AND PLACES FOR CALVES.

Departments K and M are fitted with water troughs. Those in M (Cow Stall) are to be placed in such a position as to accommodate two animals, and are kept supplied with water from taps connected with the main pipe, immediately above, which runs through the whole building from the water cistern.

- N**—DUNG AND MIXEN YARD.

The advantage of this department is that the manure is kept free from rain, and the bottom being formed in the shape of a saucer, with a grating and drain, conveying the overplus liquid, when required, to the manure tank, no waste can take place. This department, although under the same roof, is separated by a party wall from the Stock. An open space adjoining the mixen and dung yard will, in some cases, be found convenient as a place of deposit for earth, sand, ashes, &c.

- O**—THE PIG STYES,

The plan adopted with them is to secure cleanliness and warmth by having the flooring formed of Memel deal laths,  $1\frac{1}{2}$  inch thick and about half an inch apart for small pigs; one inch for middling size, and one and a half inch for full size, and this being raised about two feet, the manure falls immediately through and is collected below for the purposes of mixing, &c.; the liquid runs away to the manure tank, and the solid is removed to the covered manure yard adjoining. Some prefer a small pit underneath, in which they place ashes, which, when well saturated, are fit for top dressing or drilling. Fuller



particulars are given at page x, so that various plans may be adopted according to circumstances and opinions. See p. 13 on drains for styes and cow houses, &c.

**P—MANURE TANK (underground) AND PUMP.**

It is proposed that connecting drains shall run from the Yard, Cow Stall, Stable, Piggeries, &c., into the tank; from thence it may be pumped into the manure cart for distribution, or turned with the aid of a shoot, or gutta percha tubes, upon the manure heap in the yard, where composts of various descriptions may be made. *p. vi.*

**Q—WATER CISTERN, underground water TANK and PUMP.**

The Cistern is placed at such an elevation as to collect the water from the roofs of the buildings by shoots, and, when filled, to flow, by a pipe, into a large underground tank, with which the pump is connected. From the upper Cistern a main pipe runs through the building, supplying every department with water, so that the labour of carrying water will be discontinued. When the Cistern is empty it is re-supplied by the pump. Underground tanks are used on the South-downs, and if properly managed, sufficient water generally is collected for all purposes, but a dry summer like 1851 must try such reservoirs as depend on rain. In districts where supplies of spring water can easily be obtained, the pump may be connected with a well instead of a tank, but rain water is preferred by many.

**R—A General Passage, passing through the whole range of the building, affording an immediate communication, under cover, with every department, and along which runs the main drain for conveying the liquid manure to the tank. This and the connecting drains may be flushed or rinsed as often as required from the water pipes to the manure tank, taking care not to add more than two thirds of water to the liquid.**

When the Designer of these Models first produced several original plans of Farm Buildings, adapted to the present improved and improving condition of farm management, he had little idea that the result of his humble efforts or practical experience would be exhibited in so vast an arena as the World's Fair in 1851; but urged by the solicitations of many friends, and by the idea that what he had designed in the first place for his own immediate benefit, might, if generally known, be of some public service, he yielded to these wishes, and has endeavoured, in a brief and plain manner, to show the advantages which must accrue from the erection of well-arranged Farm Buildings, with their necessary attendants—economy of labour and judicious management. The great drawback in many homesteads, even in improved modern ones, is the want of compactness in the design; having no uniform plan, each department is at an inconvenient distance from one another, taking unnecessary space in the ground plan, and occasioning loss of time and waste in feeding, all of which in our design we have endeavoured to correct.

Mr. Baxter has been for a series of years peculiarly connected with Agriculture, by the publication of his Library of Practical Agricultural Knowledge, in two volumes, dedicated to the Royal Agricultural Society, with Portraits and Lives of the Duke of Richmond and the late John Ellman, Esq., and he may be permitted to state that the Reviewers recommend it as a Work which ought to be in the hands of every landowner and tenant farmer in the kingdom. He is also the publisher of a set of Farming Account Books, pronounced by the late Sir George Sinclair, Bart., Mr. Cobbett, and the first Agriculturists of the day, to be the best ever produced, and of several other Works adapted for the Agriculturist. Of late years, with a view to promote the spread of root culture, he established the South of England Annual Root Show, at which many prizes are annually given for turnips, mangel wurzel, &c., the competitors giving the result of their experience in the *Sussex Agricultural Express* newspaper, and many facts of a valuable character have in this manner been made public. These few remarks will explain the position of Mr. Baxter with regard to Agriculture.

The models are upon a much smaller scale than was intended, as Mr. Baxter was allowed only two feet six inches in length. They were placed, too, unfortunately in an obscure corner in a passage near the fine arts court, and not, as they should have been, in the ag-



ricultural department, thus hundreds were disappointed who went purposely to see the plans; but this may be sufficient for the practical man to see the general system of arrangement, as the same plan can, of course, be carried out on any scale, so as to suit various sized farms. No 1 is of square construction, and appears of a more familiar character than No. 2, but the arrangement of the latter is to suit a different ground plan. Each of the buildings contains precisely similar departments and conveniences, so that a general description of one of the Models will be all that is necessary. Of course these buildings may be erected of any material suitable to the locality. The estimated price of the same is given in the last page.

In proceeding to the erection of these buildings, the ground in the interior should be prepared with a fall from the highest end, raised about a foot from the surface, particularly if on a flat situation, to keep the stock dry, and to facilitate the drainage, and if the surface were well puddled, or rammed with clay, it would be better prepared to receive any kind of paving; bricks will be necessary in the stable, whilst in the cowhouse, passages, &c., concrete would answer the purpose. The passage which leads down the side of the long building, and the centre of the square one, will have a main drain formed of open drain tiles leading to the manure tank, with connecting branch drains to the horse and cattle departments. The smaller drains in the stable may be of cast iron, similar to those in cross street pavements, with a small opening an inch wide along the upper surface; they would not then interfere with the horses' hind feet. With neat stock, an open drain, as usual, may be best. Excepting from the cows the dung may be moved in the usual manner, but it will be observed that in the model the cowhouse adjoins the dung yard, so that the manure may be thrown into it through an opening in the wall. The building is eight feet from the floor to the eaves, and 25 feet in width—a size sufficient to accommodate six cows in each row, with a passage leading through to all the departments. This will be large enough for a moderate sized farm; but if the occupation is extensive, the long model may have another corresponding range by its side, the centre being supported on posts or pillars. This arrangement doubles the size of every department, and as one centre passage would be sufficient, three or four feet would be gained in the additional portion. The short model could also be on an enlarged scale, and as the passage will be taken from one of the sides, will give more space for accommodation, as the centre would have to hold both roofs by pillars; in fact the dung yard cannot be too large, and if the covering of the whole yard is too expensive, an open space adjoining would be very convenient for depositing mould, ashes, &c., for mixens. Large barns are not considered so necessary as formerly, as corn is thought to keep better in stacks; and since the introduction of thrashing machines it is more convenient. We have proposed no special department for thrashing machines or steam power, but these could easily be added, if required, and under the same succession of roofing; ventilation will be found amply provided for by the doors and windows in the building, but if there is any doubt about it a few air bricks in the walls or perforated zinc will have a good effect. The escape of the vitiated air may be effected by means of louver boards, or openings in the ridge tiling.

#### LIQUID MANURES.

It will be seen that many of the following observations are collected from different sources, and we hope may lead to beneficial results; although they are conflicting in some instances, yet we deemed it advisable to give the different opinions; much more might be said, but we have endeavoured to apply the practical results of well-tested experience.

Any liquid which exercises a fertilizing influence upon the soil must be considered, strictly speaking, as a liquid manure. The ordinary water of springs and rivers, some more than others, has this influence; and rain water brings down from the atmosphere carbonate of ammonia and other enriching gases; but these, like the atmosphere and alkalies of the soil, are natural agents, and are not considered manures in the technical sense. Urine by itself, or diluted, being considered the chief liquid manure, its manufacture is more fully considered here, the application of mere water belonging to the science of irrigation rather than to the practice of the homestead. The value of this manure was known at a very early period to many nations. The Chinese for centuries



have used a mixture of night soil fermented with water; the farmers of Germany, Switzerland, and Holland have long practised the system which is daily attracting more general attention in this country, and the time will soon arrive when but few farm yards will be without a manure tank. Some say unless liquid manure is kept four or six weeks, so that it may ferment, it is not of so much use as might be expected, while others contend it is quite as effectual used fresh. We have seen instances of its good effects applied in both ways. Knowing, then, the value of this class of manure, we have adapted our model buildings with a view to the proper collecting and preserving of the urine of the stock, by having improved drains from each department to the tank; minor alterations, to suit peculiar localities or practices, may be made, but the fundamental principle of the plan is the effectual collection of the liquid, which, combined with the soluble portion of the farm yard manure, constitutes, in fact, its richest part.

The mode in which this powerful fertilizer operates, we will endeavour to show. The roots are the chief organs for absorbing the food of plants, and of the roots, the small delicate fibres are the parts which have, in the greatest degree, the power of absorption; and hence the reason why they increase in length as the soil is exhausted. It is from this cause that liquid manure is so valuable; as it penetrates the earth and is more easily soluble by the plant. Mixed with dung, its value is increased, for dung, with four or five times its weight of urine, successfully produces the most luxuriant crops. This is an old practice on the continent, and is gaining favour in England, where a disposition is always manifested readily to adopt improvements, and whose agriculture, after all, is the pattern for the rest of the world. Urines of animals differ much in composition, and are very different when they become stale or putrid, a great chemical change having taken place; but experience has proved that the mixture of an equal quantity of water before fermentation, is attended with great advantages, as a greater amount of ammonia is absorbed in the bulk, which would otherwise have escaped; and if we consider a cow furnishes during the year 15,000 pounds of urine, and that no less than 162 pounds of ammonia would be lost unless we adopt this system, the necessity of a proper absorption of this substance in this way is sufficiently clear. Cattle urine when thrown upon farm yard manure may, perhaps, lose some ammonia, but if afterwards collected, (which our plan will allow to be done by means of a drain from the yard to the tank for the overplus), will be found to have made some important acquisitions, besides being beneficial to the heap, which should be kept under cover, or exposure to weather will evaporate many of the alkalies and salts, and Sir Humphrey Davey says, the more the dung is exposed—the more it is subject to the washing of the rain, the poorer and more exhausted it must become. Urine, undiluted with water, scorches tender plants, particularly in dry weather; it is, therefore, contended by some that partial decomposition is necessary to render it ready for use as a liquid manure. Substances of an acid character, added to decomposing urine, fix the ammonia and add to its value; copperas has sometimes been used for this purpose with beneficial effects, but a large quantity is necessary to fix all the ammonia, and this would be too expensive. Alum is also too dear. Wood vinegar, if it can be cheaply procured, or diluted sulphuric acid, is successful, but pure water is the readiest, and in equal quantity to the urine will be found largely to fix the ammonia. The peat charcoal has been lately used as the best fixer of ammonia, while it prevents unpleasant smell and is said to add to its quality, and it is not expensive by the ton. Urine, five or six months old, it is stated by an eminent chemist, loses its original urea, mucus, and albumen, and gains carbonate, sulphate, and humate of ammonia, humates of lime and magnesia, common salt, also some benzoate, lactate, and acetate of ammonia; this will show the effect of proper fermentation. Rape cake mixed with putrified urine is a valuable manure, but water should be added. Liquid manure is fit for application when the scum ceases to rise, as its causticity has then ceased; about four weeks has been mentioned as the proper time for fermentation in the summer, and six weeks in winter, but this depends on the warmth of the atmosphere. In Flanders they have a partition in the cistern, so that part is in preparation whilst the other is being filled. By this means every facility is afforded to manufacture that valuable manure called Gulle, which is so extensively used in those parts.



This is a mixture of the excrement of cattle with urine modified by water according to circumstances. So important is this mixture considered in Switzerland and Germany, that nearly all their manure is applied in that way, particularly on their meadow lands; they mostly put about half water and half liquid, and solid manure into the tanks daily, where it ferments. By flushing and sweeping the trench with water, the proper quantity is added, while cleanliness is obtained. Our models are adapted to carry out this system upon a better principle. The drain in its passage to the tank adjoining the dung yard may be made to run first into an open reservoir about a foot deep, six or eight feet long, and three or four feet wide, securely paved, and bricks laid in cement. In this place will be collected all the liquid manure, and the solid must be conveyed to the same place, where it must be stirred up together to the consistency of cream; water being added by flushing and sweeping the gutters. A drain, deep enough to empty it, leads from this reservoir to the tank, and each time the reservoir is filled a sluice board is lifted up and the contents run into the tank; the board again closes the drain and the process is repeated. Another plan, where manure is wished for drilling or other purposes, is to have a place adjoining this open reservoir, where the manure can be thrown out, instead of going to the tank, and mixed with ashes or any other substance required, and lay to ferment. We suggest that peat charcoal be sprinkled in the drains occasionally, as it will be found to take away all smell, while it adds, it is said, to the fertilizing quality of the manure. We have used it at Oaklands, in various ways, with advantage. In the south of Europe liquid manure is generally mixed with three parts water for meadow land. The Chinese use liquid manure in great quantities; a government officer is actually appointed to seal the vessels and ascertain that the contents undergo the proper fermentation before it is used; it is then sold in small quantities for garden crops, &c., being diluted before application. Charred peat, charred saw dust, and pulverized charcoal may be advantageously employed with liquid manure as a mixen. It ought to be mixed first with a quantity of water if it cannot be subjected to putrefaction. It should before application be passed through a basket or straw, or the residue will cling to the plant and make it objectionable to the cattle; it should not be applied during a frost; it is also better to wait till the ground is open for irrigating meadows. Mr. Thompson, at his Agricultural Repository, at Lewes, has invented a manure pump, so as to bring up the pure liquid without the sediment. It has been suggested, particularly where the tank is small, that a portion may be pumped into the liquid manure cart, and there diluted to the required strength by a tap from the water tank, which will prevent the sacrifice of the ammonia, and much time will be gained for meadow distribution. Of the quantity to be applied much depends on its strength, the nature of the soil, and the character of the crop, and the time of year it is used. In wet weather it will be found more beneficial than in dry. The Germans apply more on clay than on sand: on the former they put about thirty thousand pounds per acre; on the latter about twenty thousand pounds: its effects they calculate do not last above one year, but we have seen the good effect last much longer. The Flemish apply at the rate of 2,480 gallons per acre to their flax crop. In this country it is done principally by a liquid manure cart. Liquid manure is most generally applied to meadows, to clover, and to lucern, and often upon rye, barley, and rape; but it is of much less advantage before sowing, and would comparatively fail on a fallow; it is also more efficient on sand than on clay. On light soils it is, under favourable circumstances, of much effect with wheat; but on proper wheat bearing land it is not so generally useful. It also increases barley straw, and though not so efficient with turnips as farm yard manure, in garden crops its value is very great. The following analysis will show the comparative value of some of the farm yard manures:—100lbs. of farm yard manure will produce a certain effect; 200lbs. of liquid manure (Flemish), 125lbs. cow manure, 73lbs. solid horse dung, 91lbs. liquid cow dung, 64lbs. pig dung, 36lbs. sheep dung, would produce a similar effect. It may, perhaps, occur to the farmer that the quantity of solid manure thus conveyed to the soil, will not in reality exceed two or three tons per acre, and this appears a small allowance; but it must be remembered that this consists of the soluble or richest portion, and is, in fact, the extract without any straw or other residuum. It may be easily



and with good results applied to grass land; it is best applied in wet or showery weather, as it is more readily and easily absorbed by the soil. We may here mention an experiment made by a gentleman at Lewes, Sussex, who applied ten tons of cow-house liquid per acre by means of a water cart. The land produced twice as much grass as when not so manured, and it was free from weeds, which had evidently been choked by the grass while the herbage of the other parts was poor, short, and foul. This experiment was fully recorded in the *Sussex Express* newspaper at the time. Sir Humphrey Davy says, "All urine contains the essential elements of vegetables in a state of solution. During the putrefaction of urine, the greatest part of the soluble animal matter that it contains, is destroyed; it consequently should be used as fresh as possible. Thus may be observed the different opinions; but it is beneficial either fresh or stale, properly diluted, and applied in favourable weather; but if not mixed with solid matter, it should be diluted with water, as when pure it contains too large a quantity of animal matter to form a proper fluid nourishment for its absorption by the roots of plants.

The amount of liquid manure produced by the live stock of a farm is more considerable in bulk and quality than is generally supposed; each bullock will make daily about two gallons, and the estimate of its worth should be made, not only when viewing it in its undiluted state, but when mixed with water; since, however valuable the fertilizer may be in its pure state, its value is much increased by the addition of equal bulks of water, and in many instances more water will be found beneficial, according to its strength, and where it is to be applied, and the season. It then becomes not only more fertilizing, but in favourable localities may be made productive of the richest crops of grass. Speaking of grass crops, we may here observe that the result of an experiment tried near Glasgow, showed that in some fields sown with barley and grass seeds, watering with cow urine was so successful, that the grass was cut five or six times a year, and though not very long, was so rich and thick that it would have rotted if not cut often. The first cutting took place in April, and was followed once a month, the land being irrigated with the liquid immediately after. Sir J. Sinclair saw one of these fields which had been cut sixteen times in three years, and the Rev. A. Huxtable, who has done much for the advancement of agricultural science, says that he uses liquid manure diluted with water. In hot weather a larger quantity of water is added for his clover and Italian rye grass, and the result proves to him that you may cut it without doing injury, if irrigated immediately afterwards. A practical man of eminence in the farming world says he has two farms, on one of which all the urine of all the cattle is applied in a very diluted state by means of underground pipes to where he applies it; the bulk of water added is sufficient to absorb all the ammonia. On the other farm undiluted urine is mixed with burnt earth, sawdust, ashes, or dry earth finely sifted and dried under a covered shed, and then moistened again and again till it is perfectly saturated with the salts of the urine, which are retained by the absorptive powers of the soil; this is drilled in for turnips or for wheat, but in either case he uses the urine as freshly as he can; this, it will be seen, is different to the course of fermentation recommended by many writers, yet this gentleman has practised its use advantageously for years.

In the construction of tanks but little difficulty will be found: in fact it is now sufficiently understood. It will be seen in our Model that we have provided a pump, raised sufficiently high to convey the fluid into a manure cart or barrel, if irrigation be required, and also high enough, when a long shoot or a gutta percha tube is attached to the spout, to convey it on to the manure mixen, when manure manufacturing is proceeding in the covered manure yard; and we feel satisfied, that by judicious management, manure tanks, in a well drained homestead, will amply repay any farmer by their cleanliness, and by keeping all the cattle in well drained stalls, stables, and sheds; purifying the atmosphere, and, by its use, fertilising the soil. Having said this much more immediately with regard to the application of liquid manure to the soil, we will now briefly call attention to the mixen yard, —that important department of farm yard management.

#### DUNG AND MIXEN YARD.

A reference to our plan will show that we have made ample provision for a class of



work not so much attended to by some farmers, as we venture to say one day it will be ; for it cannot escape the notice of all those persons interested immediately in the culture of the land, that the subject of the proper management of manures is becoming of greater importance every day, and that the attention of the scientific world being directed to this subject, we become better and better acquainted with the requirements of nature, and find that those who seek her bounteous gifts must repay her for her favours. This subject, then, being of paramount interest to the cultivator of the soil, has been treated of in various ways. Voluminous works have been written, lectures delivered, and speeches made, so that to endeavour in our brief space to notice all that has been uttered would be in vain. We shall, therefore, very briefly notice a few practical details adapted to the farm-yard Model which it is our object to illustrate, and which may be easily adopted by any farmer who has occasion to build a new homestead, or to improve those he has already in use.

We think it will be found that a covered shed for the manufacture of manures, is one of the most valuable and necessary departments of modern farming. Here mould, ashes, and other substances may be brought and saturated by means of the shoot leading from the manure tank pump, and, in inclement weather, men may be employed in turning, mixing, or prepared ready for the drill or general purposes. In fact, this may be the farmer's practical laboratory. There can be no doubt hundreds of homesteads or farm yards in this country are ill adapted for the warmth and well being of live stock. This view of the subject, we see, was confirmed at the meeting of the London Farmers' Club, June, 1851, which resolved that a covered yard was a necessary appendage. There perhaps may not be sufficient inducement for a yearly tenant to undertake and carry out modern improvements ; but we believe, if he will refer to the models, he will see that some requisite alteration in his own yard could be easily contrived at a moderate outlay ; and the profitable management that would accompany better arranged buildings, would lead to still further improvements.

With an old inconvenient yard we should suggest that the bottom be put in order, if required, and made water-tight, hollow towards the centre, and that drains be laid on from the stable and stalls towards a tank for liquid manures. In addition to this, if all the buildings are surrounded by proper shooting which might be made to supply a water tank for the cattle, a great part of the objection against open yards would be removed, at all events shoots should be made to prevent the overflowing in the yard. In our plan, we have provided for both a covered and open yard, but in either case it should be puddled with clay, or other substance impervious to wet or soakage. This would soon amply repay for the outlay, and be a source of profit to the farmer.

The models may not, perhaps, be arranged to suit every agriculturist, as more room for cattle may be required ; but, as we before mentioned, to meet that case the size of the plan may be increased ; we think, however, that for the generality of farmers, the arrangement exhibited in these plans, will be conducive to economy, cleanliness, and profit.

#### CATTLE STALLS.

The divisions or partitions between the departments and stalls may be about five feet high, and made either of post and rails only or close boarded. By this arrangement the stock may be seen at a view, although some would prefer the stable close boarded up. Some agriculturists have adopted boarded floors for neat stock, similar to that in the piggery, or perforated ; but this plan is not at present much used, and, we believe, never will be. It would require considerable outlay to adopt it for large farms. The owners of some of those which we have seen on this plan speak favourably of them, and one gentleman with whom we are acquainted has now fifty calves on lath boards. We saw them last year, just after their purchase and confinement ; since which they have been well fed, and are now, the owner says, become quite little bullocks, but there is much doubt on this management. Brick floors, or concrete, are more generally used for neat stock ; we suggest that open drains at the bottom of the neat cattle stalls, as commonly employed behind the animals, will add to their cleanliness. Our arrangements, it will



be seen, secure warmth, for it is an acknowledged fact that animals produce more both of flesh and fat when kept in a state of repose, and at a moderate temperature than when exposed to cold. The water is easily supplied by pipes from the tank by taps which are placed in the stalls; each tap and drinking place will supply two animals, the cistern being placed between their heads. It will be seen by the model that the preparation of food, &c., may be going on in all weathers with comfort to the workpeople.

#### PIGGERY.

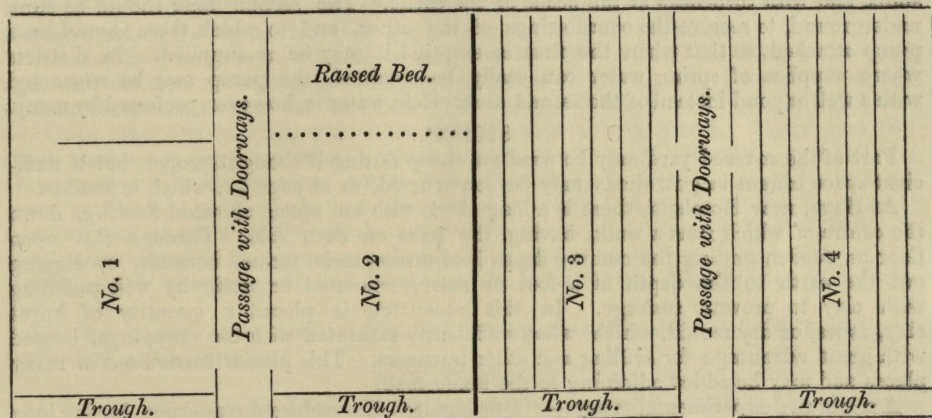
[Continued from page 8, where the models are more particularly described.]

The novel plan of lattice flooring is said to be conducive to the health of the swine, and to be a particularly clean method of keeping them. We have one in use, but we are inclined to doubt its preference, as the air draws up and makes them cold. The flooring of the styes is raised two feet from the ground, with a latticed floor for the droppings to pass through. The ground being a little sloped the liquid manure will thence flow away into the tank by a gutter made for the purpose, and the residue is raked out to be deposited in a manure heap. We think the plan of drains, as explained in the last page, will supersede this plan. With regard to the value of pig manure, we may observe that so powerful are its effects, that three times its quantity of either fluid or substance, is necessary, or at all events advantageous, before it is applied; and if kept separate from the other manure, it may be mixed up with mould or ashes and applied as Guano. Great effects are said to have resulted from this mode of proceeding, and a gentleman who tried the experiment calculates that the droppings of three pigs, preserved and mixed in this manner, drilled two acres of turnips. The liquid, with three times its quantity of water added, is a good fertilizer for grass land.

Some additional remarks to the foregoing, connected with the subject of our Models, are worthy the attention of those persons who are either forming new piggeries or wish to improve their old ones. In the first place it is an admitted fact, that swine will not thrive well, unless kept dry and warm in a properly ventilated building, and we will appeal to the reader, whether he has not witnessed the sweating and reeking bodies of pigs, kept stench up in a sty with a sleeping place hardly large enough for them to enter. The raised roof of our models gives all the advantages of a dry, warm, and well ventilated abode. We have therefore kept in view these objects in the following suggestions:—The opening or front of all pounds should, if possible, face the south; and we have heard it remarked by many experienced breeders that pigs will not thrive so well in any other aspect; some contend this is not of consequence. Let the pound be made large enough for the number intended, and we think that the following plan will be found cheap, healthy, and advantageous:—If a set of styes be required, erect a covered hovel with permanent back and ends, each sty having a hanging shutter over the feeding trough fronting the yard, the width of the same, that it may be opened for feeding; this hovel will, of course, be of dimensions to contain the required number of styes, and the eaves must be of sufficient height to admit the attendants; it should have a good foundation of brick or flint work which should rise two feet above ground; as this will have to form a part of the foundation impervious to soakage, the bottom should then be well puddled with clay before paving, keeping it high enough to secure a fall to the tank, and openings should be left, through which the surplus liquid should run to the manure tank; all the pounds should be paved whether lattice floored or not; on this foundation the flooring of the styes should be laid when latticed floors are used, thus forming a reservoir beneath. Part of this flooring may be so formed as to lift up or open with hinges; the joists should run from front to back, so that when necessary a man could easily clean it out by scraping the manure and a few pails of water and a broom would then rinse out the bottom, and add to the contents of the tank; if, however, the styes be small, the dung may be raked from beneath the floor without disturbing it. In this case the front wall should be about one foot high; the back and ends being two feet, this will leave a foot open in front, from which place the manure may at any time be raked out, for the front part having an inward slope, the hoe will easily draw out the manure; a moveable shutter will close this opening under the floor when necessary. Many parties make a large quantity of dung by placing burnt earth beneath to soak up the liquid. The hovel, whether built of brick or timber, must



have a shutter in front of the feeding troughs ; if these be hung clear over the trough with hinges at the top, it can be unbolted and pushed to the inner side of the trough, and, when this is filled, the shutter is brought forward and rebolted to the outside forming the front. The following outline of different plans here suggested may be of assistance in the improvement or reconstruction of old styes, and in the fitting up of new ones.



No. 1 is the old fashioned plan, excepting the whole being covered from wet, raising the sleeping place about six inches and with a drain leading to the manure tank from the pound. We think a boarded floor for sleeping is much preferable for warmth.

No. 2 we will call Box feeding, being similar to that plan. The sleeping place is considerably raised, and the brick floor sloped down to the bottom, the pavement being laid on edge so as to prevent the animals slipping about; in this outer part the manure is collected, fresh straw being thrown in daily, which is soon trodden down, by which means a large quantity of rich manure is made; when it reaches the height of their bed it is forked out and the place filled anew. Their bed should be swept daily to the lower part and the new straw given them to sleep upon. This sty may be easily floored with a lattice level with the sleeping place if it is preferred, and it can be cleansed out as mentioned in No. 3.

No. 3 and 4 is entirely floored with lattice raised two feet on the foundation; beneath this lattice the whole of the manure is collected; by occasionally sprinkling it with peat charcoal it is rendered sweet and wholesome, while its fertilizing properties are increased. The lattice should be swept frequently. The superabundant liquid runs by a drain to the manure tank, and the other is taken out for the mixen when required. In these plans the styes are made in pairs, as the passage will be found extremely convenient. Nos. 3 and 4 may be also used for sheep if required, the passage to Nos. 3 and 4 being gradually raised to enable them to walk on the flooring when driven in; of course where the flooring is raised the sides must be made proportionately higher. The openings in the passages are for the doorways.

The liquid manure drain should run past or through the mixen yard, so that, if required, it can be stopped in its course before reaching the tank and being used for mixing.

Experience has proved that pig management is defective where shelter and warmth have been neglected. All styes, whether of the old or present construction, should be sheltered from rain or dripping from buildings.

We saw, on a farm of Mr. Mangles, at Ash, Surrey, this plan adopted, with the exception that his pit was sunk two feet, the floor being on a level with the surface, while our floor is raised two feet above, which we consider preferable for drainage. He lets the solid manure accumulate for about six weeks, the liquid manure running into the tank when the shutter over the trough is slid out, the trough removed, and part of the flooring taken up, making a space for removing it to an adjoining open shed, where it is mixed with burnt ashes or mould, and, being occasionally turned, it is then ready for drilling, &c.



## WATER.

In some localities the supply of water is very deficient. Now if all the buildings are properly surrounded with shoots, conveying the rain water to a tank, a considerable quantity would be obtained. For convenience sake two tanks are necessary; the first a tank raised a few feet from the ground, with a pipe leading from it to the stable and the stalls, and with turncocks at the heads of the cattle. The second tank should be sunk underground, to receive the overflowings of the other, and to which there should be a pump attached, so that when the first is emptied it may be re-supplied. In districts where supplies of spring water can easily be obtained, the pump may be connected with a well or pond instead of the second tank. Rain water is, however, preferred by many.

## SHEEP.

Part of the covered yard may be used for sheep fattening if thought proper, but if sufficient space cannot be got, sheds may be constructed, as at page 11, which is similar.

At Hays, near Horsham, there is a long shed, with an open, elevated flooring, down the centre of which runs a walk, having the pens on each side. Through this open floor or wooden grating the manure drops into a receptacle formed beneath, by digging out the earth to the depth of a foot or more, cemented or made by well puddling with clay to prevent soakage. In this receptacle is placed a quantity of burnt clay, ashes, or dry mould, which, when sufficiently saturated with the droppings, is used with great advantage for drilling and other purposes. This plan is carried out in many places and may be added adjoining to the homestead.

A celebrated experimentalist says—"One hundred Hampshire down-sheep, having long wool, require a superficial area of 1,000 feet, which gives also room for their food and water troughs. (Sheep should always have access to water; a lump of salt is also added by some). Each sheep has thus an allowance of ten superficial feet for itself, and its feeding apparatus. I emptied one shed tank to-day, 2 feet deep; it was 3 parts filled with burned clay or brickdust—there was no spare liquid. I put on nine loads per imperial acre; of course it was saturated and mixed with the urine and droppings, no straw. Large breeds of long woolled sheep, such as Cotswolds, Kents, &c., would require a larger area. After sheep are shorn they may be placed much closer. You will find sheep thus shedded require shearing earlier than if in the open air. One very warm day, early in May, I wondered why the sheep could not feed, but soon found they wanted their jackets off. I never had a sheep ill on boards, although about three fat ones were slaughtered when giddy. I consider the boards a cure or preventive for foot-rot.

No fermenting material should be used under the sheep or animals, or it will injure their health. Burned ashes, dark friable soil, sawdust, or dry sand, are all good. The burnt charcoal is now very generally used. Every day we sprinkle half a bushel of gypsum to each 100 sheep, on the boards. Their urine falls on it, and it is worked through, and the ammonia is preserved. I pay 15s. per ton for my gypsum. I also sprinkle salt on now and then pretty freely, and sweep it through, otherwise it makes the boards wet. I am satisfied, after two years' trial, that we shall all be board-feeders by-and-bye. I used to fold my sheep out in the day, and on boards at night, but experience has shown me what an enormous advantage there is in keeping them always warm, dry and comfortable, instead of making them "steam engines" in wet weather. We were a good deal plagued at first when we had narrow  $\frac{3}{4}$  inch openings, having to sweep the floor, and the sheep got dirty, but now with  $1\frac{1}{4}$  inch openings, there is no trouble in any way, no expence of littering. The cost of boarding and labour, per superficial yard of 9 feet, is, as near as I can calculate—for sheep floor, 4s. 2d. to 4s. 6d.; for the bullock ditto, about the same. Bricked and cemented tank under it, about 2s. per superficial yard. The urine and manure appear to preserve and harden the flooring. So great is the comfort and saving of straw that I shall extend the operation materially, and report progress when my bullocks are boarded. I shall give the bullocks a little straw, perhaps, according to circumstances."

The Royal Agricultural Society's Journal, as regards shelter, states that forty sheep, of equal size and weight, were selected; twenty of these were fed in the usual way in the open field, and the other twenty in a shed, yet the latter, although they received nearly a fifth less food than those in the open field, showed an increase of twenty stone more in the short space of four months.



Lord Ducie kept 100 sheep in the open field from the 10th of October to the 10th of March; each eat 24lbs. of swedes daily, while another 100, having covered sheds in a yard, only eat 20lbs. each of the same, proving the advantage of the latter. We merely give these few instances to show the advantage of proper and sufficient homesteads.

It would be very difficult, however, for many of our large and successful flockmasters to alter their system, and bring their flocks under this arrangement, while with good management, in the open fields, they get their sheep to great perfection.

We may here refer to an experiment made by Mr. Morton on his farm a few years ago, with the view of testing the comparative merits of feeding sheep under cover, and feeding them exposed to the weather. The period during which the experiment was continued was five months, viz., from 10th October to 10th March. There were 100 sheep confined in pens, ten in each, which had sheds connected with them, to which the sheep could retire at pleasure; whilst 100 other sheep of similar age and condition, were confined in pens, to which no sheds were attached. It was found that the average consumption of each of the shed and pen-fed sheep was 20lbs. daily of Swede turnips, and of those in pens without sheds, 25lbs. daily, while the former increased in weight on an average, each 3lbs. more than the latter, during the period of the experiment.

Mr. Morton says as to the shed-feeding of sheep, that it is the healthiest and fastest method of making mutton.

#### BOX FEEDING.

A department may be fitted up for box feeding if this is requisite, and, we refer our readers to the plan of Mr. Warnes, contained in our Library of Agricultural Knowledge, that gentleman having favoured us with his latest experience on the subject, which is there practically described. At the meeting of the London Farmers' Club, June, 1851, there was a difference of opinion, some contended for box feeding, while others preferred a covered yard, the latter, for general purposes, seemed to be favourably received as necessary.

We might give many more examples and extracts applicable to these models, which are adapted for the whole business of a farm, but our Library of Agriculture, which has been pronounced by all the leading men of the day as the best practical work extant, contains full descriptions of the proper management of stock and crops and all agricultural matters.

We have obtained from a builder of considerable experience the following estimate for the best materials and workmanship, but the cost may be materially reduced by the use of cheaper materials:—

For a Building and Yards, &c., &c., of about 200ft. long, 25ft. wide, and the walls 8ft. high above ground, with all the appurtenances connected therewith,

17s. per yard super; or,

£7 1s. 8d. per yard run of 25ft. wide or width of the building.

Cost of 200ft., at the above price, £472 4s. 6d.

For a ditto ditto, about 150ft. long, 25ft. wide, and walls 8ft.,

17s. 3d. per yard super; or,

£7 3s. 9d. per yard run, &c., &c.

Cost of 150ft., at the above price, £359 7s. 6d.

For a ditto ditto, about 100ft. long, 25ft. wide, and walls 8ft.,

17s. 6d. per yard super; or,

£7 5s. 10d. per yard run, &c., &c.

Cost of 100ft., at the above price, £243 1s. 1d.

The wide Building would be the same per yard super, whether covered with slate or tiles, and if thatched still cheaper.

N.B. Since the foregoing was in type we have communicated with Mr. Forbes, of Newark Brickwork, by Ellon, Aberdeenshire, who has invented a patent drain pavement for cattle in stalls, pig pounds, &c. It is a brick of  $12\frac{1}{2}$  by  $5\frac{1}{4}$  and  $3\frac{5}{8}$  inches in depth, by a slit  $\frac{1}{2}$  inch opening, then a little oval down to the depth, forming the under gutter, which runs to the large cross gutter, where the urine passes on to the tank; this is spoken of as the best invention ever discovered, and we think will supersede the wood flooring, as the urine will run immediately away, leaving the stock, in a great measure, free from wet.



